

REMARKS

Very thanks for Examination's suggestion and thanks for finding some citations about the present invention, thereby, the applicant may know more information about the invention. This case has been carefully reviewed and analyzed in view of the office action. All details of the reference prior arts are fully considered and compared with the present invention.

Responsive to the objections and rejections made of the Examiner in office action. We have amended the claims 8 to 10.

In the following, we will discuss the novelty of the present invention.

(A) ABOUT THE ADDED PART OF THE CLAIMS

(1) In this amendment, we add the following features of the claims 8, 9, and 10, the feature is illustrated in the drawing for discussing the novelty of the present invention.

"each directional control groove has an opening facing to a center portion of the receiving chamber; a part of each directional control device is protruded from the opening of the directional control groove to contact the ratchet;"

In the citation USP 5,417,129, it is illustrated that the grooves 56 are not facing toward the center of the receiving chamber and the directional control devices 50 are not protruded from the grooves 56. In the citation, the ratchet has a protrusion protruded from the ratchet. This makes the difference between the present invention and the citation '129. The design of the citation needs more material and the cost of mold is high. The process for forming the mold is also complicated.

Moreover, in the citation '129, the contact surface of the directional

control device 50 to the ratchet is not normal to the rotation direction. Thus the twisting force is low and the efficiency is low.

In the present invention, the contact surfaces of the directional control devices to the ratchet is normal to the rotating direction and thus it generates a greater twisting force to the ratchet and the efficiency is high. Furthermore, in the present invention, no protrusion is formed. The cost is low. The process for making the mold of the ratchet is low. The mold used in prior art can be used. It is unnecessary to design a new mold. Thus the cost is low.

From above discussion, it is known that for the added features in claims 8 to 10 have made the present invention being novel over the prior art.

(2) Moreover, the other added parts are:

"and outer periphery of the ratchet 20 having two annular trenches;"
wherein each directional control groove has an opening facing to a center portion of the receiving chamber; a part of each directional control device 31 is protruded from the opening of the directional control groove to contact the ratchet and received into a respect one of the two annular trenches of the ratchet;

Thereby From Figs. 9 to 11 of the present invention, it is illustrated that a part of the directional control device 31 of the present invention is engaged to the annular trench of the ratchet so as to provide a **radial friction force** to the ratchet. However the citation USP 5,417,129, see Fig. 2 of the citation '129, it is illustrated that the two wedges 52 contacts the ratchet at a protrusion 56 extended from a lateral side of the ratchet. It gives an **axial force** to the ratchet.

Thus, the structure and effect of the citation '129 is very different from the present invention.

(B) DISCUSSION ABOUT THE EFFECT OF THE DIFFERENT SHAPE OF THE DIRECTION CONTROL DEVICES

In the present invention, new claim 8 is the combination of the original claims 1, 2 and 3 and we add some confinement to the original claim 3 so as to form the new claim 8, however the claim 8 claims an object illustrated in Fig. 11 of the present invention.

New claim 9 is combination of the original claims 1, 2 and 4, however the claim 9 claims an object illustrated in Fig. 10 of the present invention.

New claim 10 is combination of the original claims 1, 2 and 6 and we add some confinement to the original claim 6 so as to form the new claim 10, however the claim 10 claims an object illustrated in Figs. 8 and 9 of the present invention.

In the office action, Examiner considers that ~~the wedge rectangular, hexagonal and / or to have a round end, since applicant has not disclosed that these shapes solve any stated problem or is for any particular purpose and it appears that the invention would perform equally well with a cylinder as disclosed and, since changing shape, involves only routine skill in the art.~~

Thus, in the following, we will explain the characters, functions and advantages induced from the shapes of the directional control unit.

In operation, as the spanner is used to drive an object, the ratchet 20 will generate friction force with the direction control device 31. Different forms of direction control devices will have different friction forces applied to the ratchet 20, the direction control devices 31 and the wall of the spanner contacting the outer surfaces of the direction control device

31.

In the following, we will analyze different cases in the claims 8 to 10 of the present invention.

Referring to the attached drawings 2a, 2b, and 2c, where the lines of forces of the friction forces between the ratchet, directional control device and the wall of the spanner for different types of directional control devices are illustrated.

For the friction forces normal to the outer wall A of the ratchet 20, the friction force N9 of the directional control device in Fig. 9 is greater than friction force N10 of the directional control device of Fig. 10. The friction force N10 of the directional control device of Fig. 10 is greater than friction force N11 of the directional control device in Fig. 11. This is derived from the consideration of contact area and under the assumption of each directional control device has same length and same volume.

However we consider the friction force un-normal to the outer wall of the ratchet. The Result is contrary to the above result. That is the friction force of the directional control device in Fig. 9 (claimed in claim 10) is smaller than friction force of the directional control device of Fig. 10. The friction force of the directional control device of Fig. 10 is smaller than friction force of the directional control device in Fig. 11.

From the analysis mechanics and experimental result, it is known that the forces normal to the outer surface of the ratchet provide greater braking effect of the ratchet 20, but it induces great wearing to the directional control devices.

(1) Furthermore, the directional control device in Fig. 9 (claimed in claim 10) has one chamfered plane surface and other surface of the directional control device are round surface (viewing from the cross section as illustrated in Fig. 9). This is because in this design, the round

surface of the directional control device will buffer the friction between the directional control device 31 and the wall of the spanner 10 contacting the directional control device 31 so that it has less damage to the wall of the spanner, but since the round surface of the directional control device 31 is smother so that as the spanner is used to drive a screw, at the initial stage of the screwing operation, the directional control device 31 will slide to a tight position. This, at this initial stage, the twisting force from the spanner to the screw is low. It has also a disadvantage of sliding of the directional control device 31, as the directional control device is worn when it is used for a longer time. This is because the round surface of the directional control device easily rolls along the wall of the spanner, but this disadvantage can be overcome by using material of greater hardness to make the directional control device.

The spanner illustrated in Fig. 9 of the present invention is suitable for spanners of larger scale since it is used to drive a greater scale screw.

However the case in citation USP 5,417,129, has no round surface as those disclosed in Fig. 9 of the present invention, and thus it cannot provide the advantages above mentioned about the Fig. 9.

Thus, we can conclude that the claim 9 is novel over the citation '129. It has different design from the citation '129 and it provides some advantages which cannot provide by the citation.

(2) For the directional control device 31 in Fig. 11 (claimed in claim 8), for the same volume of the directional control devices in Figs. 9, 10 and 11, from the above analysis (see the drawing provided in the response for the discussion), since no force normal to the wall of the ratchet, and the two forces N_{10} , N_{10} will cancel from each other, the friction force between the ratchet 20 and the directional control device 31 is the smallest one. Since the friction force is smallest, the wearing at the connection of the

directional control devices 31 and the wall of the spanner is also smaller. Furthermore, since the shape of the directional control device is rectangular, it is very difficult to rotate the directional control device within the recess of the spanner even the directional control device wear due to long period using time.

However the citation USP 5,417,129, the rectangular directional control device 50 has a whole side contact the ratchet and three sides contact the wall of the spanner in the groove. It generate a greater friction force to the ratchet and the wall of the spanner. The effect of the citation '129 is different from the present invention.

Furthermore, the design consideration of the present invention is different from the citation.

(3) For the directional control device 31 in Fig. 10 (claimed in claim 9), the cross section of the directional control device has a hexagonal shape. From the consideration of the shapes of this design, it can induce from above discussion in item (1) and (2) that the effect of the design in claim 10 is between those in claim 8 and 9. There are three faces contacting the ratchet. One face normal to the surface of the ratchet and two faces are un-normal so that it's effect is between the effects of the designs in items (1) and (2). The same discussion is suited to the sides contacting the wall of the groove of the spanner.

Thereby, it provides middle effect and thus the effect of this design is not like the citation '129. This can be easily known and the details will not be described herein.

(4) From above discussion, it is known that the present invention provides various designs which also have different effects to be selected by users. All these effects cannot be achieved by the citation '129.

(C) RESULT


From our experience, different shapes of cylinders make different effects to the spanners so that the spanners can be used to various conditions as required. Thus the shapes of the cylinders are meaningful which construct the novelty of the present invention.

Since in above discussion, it is apparent that no prior art has the features of the present invention, especially in new claims 8, 9 and 10. Furthermore, as we know that no other prior art has features of the present invention. Thus, the present invention is novel and inventive.

Applicant requests and authorizes Examiner to amend the claims of the present invention so that the claim can match the requirement of U. S. Patent. Attentions of Examiner to this matter is greatly appreciated.

It is now believed that the subject Patent Application has been placed in condition for allowance, and such action is respectively requested.

Respectfully submitted.


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